

The facial, therefore, forms a horseshoe, of which the first and third portions are horizontal, and the second, more short, is vertical. The nucleus of the external motor oculi nerve is situated in the concavity of this horseshoe, and it gives some fibres to the facial. Finally, in sections parallel to the floor of the fourth ventricle, MM. Duval and Graux have been able to follow fibres going from this nucleus to radicular fibres of the motor oculi communis of the opposite side. In this way they explain the facts of functional paralysis of one internal rectus associated with paralysis of the external rectus of the opposite side. The third cranial pair has, therefore, a double source of innervation.

THE PHYSIOLOGY OF THE BRAIN.—Orchansky, *Inaug. Diss.*, St. Petersburg, 1877. (Abstr. in *St. Petersburger Med. Wochenschr.*, No. 41). This dissertation comprises three parts: A historical sketch of the question of psycho-motor centres; a critical review of the doctrines regarding these centres; and the researches of the author, with his conclusions. From the historical *résumé*, it appears that experimenters have adopted different opinions, on account of the various methods (electric current, chromic acid, jets of water) employed. He lays down the following, after a thorough critical analysis of the views presented on the psycho-motor centres: 1. A physical localization of the electric current in special regions of the brain is to be considered as probable. 2. There is a great probability of the psychic organs in the surface of the brain, and of motor organs in the more deeply situated portions. 3. The character of the processes following irritation of the brain is ganglionic, *i. e.*, central. 4. The improbability of a specific character and indivisibility of these centres. 5. The obscurity of the method of transmission of the excitation from the psychic to the motor centres. 6. The separation of the cortex into motor and non-motor parts, rests probably upon an anatomical basis, but is still little known. 7. The cause of the presence of non-motor sections with the motor centres in the motor regions is still unknown.

The author's own experiments were performed on dogs and rabbits. For the solution of the question of the possibility of the localization of the electric current in the brain, the author applied the needle-shaped platinum electrodes to the brain itself, at the distance of from two to four millimetres from each other, and he found that with a weak current, (20-30 mm. slide of the helix) with closer approach of the electrodes to each other, and superficial penetration of the electrodes into the brain-substance, the current could be well localized. A repetition of Hitzig's and Ferrier's experiments gave the following results: A gentle, careful contact of the particular points of the cortex with small blunt electrodes caused muscular contractions; that the motor zone is better isolated in dogs than in cats and rabbits, and that each excitable point is surrounded by a less excitable tract. The author found in rabbits, points irritation of which produced homolateral contractions. (Hitzig found only contralateral and bilateral ones). He noticed contractions of the cutaneous muscles at the same time with those of the trunk, and likewise a direct relation between the strength

of the contraction and the superficies of the metallic closing by the Neef hammer. The greater this was, the stronger was the contraction, the closures must, however, follow each other rather rapidly to produce this effect. The distinction of the motor zone depends, according to the author's opinion, upon the difference in thickness of the gray cortical substance, which is thinner in the furrows for the vessels of the pia, and those parts not covered by visible vessels are the ones, according to Hitzig, in which are situated the psychomotor centres. Besides it thus happens that the fibres of the white substance, which always stand perpendicular to the gray, come to lie, in relation to the superficies of the brain, at various angles of 0° to 90° ; and then, according to Dubois Reymond and Bernstein, the current is so much the weaker in its action on the nerve as the angle formed by the two approaches a right angle, so it must be accordingly more ineffective in those parts of the cerebral convolutions where the cortical layer is thickest.

For the answer to the question as to the mode of transmission of the nerve irritation from the so-called centres, the author undertook a series of experiments, and came to the conclusion that this transmission took place, when weak or medium currents were employed, in a physiological way through the ganglion cells, but that with strong currents the possibility of a direct excitation of the white nerve fibres could not be excluded.

THE DEVELOPMENT OF THE NERVES IN VERTEBRATES.—Mr. Balfour's discovery that the spinal nerves of sharks and rays are developed as outgrowths from the central nervous system has been followed by a similar revelation with regard to birds. Mr. (now Dr.) A. M. Marshall (of Cambridge) has given an account of investigations respecting the origin of nerves in the fowl (*Jour. Anat., Apl.*, 1877), describing a longitudinal ridge arising on the summit of the neural canal, and giving off paired processes, the rudiments of the posterior roots of the spinal nerves. Hensen has made analogous observations on the spinal nerves of the rabbit. The anterior roots arise later, distinct from one another, as processes from the spinal cord. Mr. Balfour has endeavored to solve the difficult question of the relations of the cranial to spinal nerves. He finds, as yet, no traces in the brain of anything comparable to anterior roots of nerves; all the nerves are posterior roots. The fifth, or trigeminal, arises from the dorsal summit of the hind brain very early, just like the dorsal root of a spinal nerve. This nerve also, instead of being a compound one, is, at any rate in its origin perfectly simple. The auditory nerve and the facial arise by one common root. The glosso-pharyngeal and vagus have a series of distinct roots. This number, and their origin like so many separate spinal nerves, opens up interesting questions in regard to the primitive segmentation of the head, and the loss or condensation of segments in the evolution of the vertebrates. Dr. Marshall's observations on the cranial nerves of the chick, so far as they go, correspond to Mr. Balfour's. It appears that there is no definite indication of a limit between head and trunk afforded by the central nervous cord, by the outgrowths from it, or by the mode of